

Science

Chemistry

Concordia University Loyola Campus

Faculty of Arts and Science



104. AC



DEPARTMENT OF CHEMISTRY

COURSE GUIDE

This course guide has been prepared months in advance of the upcoming academic year and information contained herein is subject to change.

Students are advised not to purchase any texts without the approval of the department or professor concerned.

Chemistry Department

482-0320

<u>Faculty</u>	<u>Location</u>	<u>Local</u>
Chairman		
Doughty, Dr. M.	DS-308	303
Professors		
Graham, Rev. A., S.J.	AD-225	202/203
Nogrady, Dr. T.	DS-306	279
Associate Professors		
Ekier, Dr. K.	DS-420	284
McElcheran, Dr. D.	DS-407	334
Patten, Dr. R.	CC-323	262
Trudel, Dr. G.	DS-210	405
Zienius, Dr. R.	DS-136	252
Assistant Professor		
Hogben, Dr. M.	DS-140	449
Lecturers		
Baldwin, Mrs. M.	DS-135	340
Hui, D.	DS-138	383

DEGREES OF THE DEPARTMENT OF CHEMISTRY

1. Honours in Chemistry. Generally taken by students who wish to go on to graduate schools.
2. Major in Chemistry. Sufficient basic chemistry, 11 1/2 courses for those who wish to proceed to industry or teaching.
3. Major in Biochemistry and Medicinal Chemistry. A new programme of a type not offered anywhere else in the Province.

Not all courses offered by the Chemistry Department are described in this Guide Book. Many courses are in process of rearrangement and compilation.

A telephone call to the Chairman (Local 331) will bring you the latest information on all aspects of the Departmental work.

CHEMISTRY 112. Full course
GENERAL CHEMISTRY

Professor: Dr. K. Ekler

Description: General principles of chemistry, gas-liquid- and solid states; periodic table; atomic structure; the chemical bond; oxidation-reduction; concentration of solutions; chemical equilibrium; solubility product; reaction rates; bonding theory; radio-activity.

Three one-hour lectures per week, one 3-hour laboratory per week - for two semesters.

Texts:

1. Masterton and Slowinski, 3rd Ed.
2. Sorum: "Introductory Semimicro Qualitative Analysis." 4th Ed.
3. Schaum: College Chemistry, 5th Ed.

Prerequisites: The course starts at the fundamentals of chemistry. Students do not have to have previous chemistry courses. However, the pace of the course is such that students have to work very hard.

Evaluation: Based on 3 class-tests, laboratory performance and final exam. To pass the course, students must obtain a passing mark in both theory and laboratory.

CHEMISTRY 251 A Half Course
INTRODUCTORY PHYSICAL CHEMISTRY FOR ENGINEERING STUDENTS.

Professor: Dr. K. Ekler

Description: The states of matter based on Kinetic Theory; work, heat, first law of thermodynamics; Carnot cycle and second law of thermodynamics; reaction kinetics; Maxwell-Boltzmann distribution; phase equilibria.

Three one-hour lectures per week - for one semester.

Text: Barrow: "Physical Chemistry" 3rd Ed.

Prerequisites: Students must have a very good grasp of Chemistry 112, differentiation and integration. Students have to work hard to obtain a good mark as the pace is brisk.

Evaluation: Based on 2 class-tests and final exam.

CHEMISTRY 300

CONCEPTS OF SCIENCE

Taught this year: M. Hogben and guest lecturers.
M. Hogben has coordinated this course twice before though he has taught the astronomy section the two years previous to that.

TYPE OF COURSE

An elective course for students outside the science discipline who perceive that a lack of science background may alienate them from much of the world's activities and writing.

PREREQUISITES

None. This course is not open to students who have successfully completed Chemistry 112 or Physics 101 or an equivalent course at CEGEP. If in doubt, ask the instructor.

OBJECTIVES

1. To learn the fundamental principles of concepts within the physical sciences.
2. To apply these principles to the practical disciplines of astronomy and photography.
3. To recreate curiosity in discovering the structure and interactions within macro and micro states of matter.

COURSE CONTENT

The electronic and nuclear structure of atoms.
The phenomena of light and optics.
Chemical principles: stoichiometry, bonding.
Redox and acid-base theory, dynamic equilibrium.
Heat and thermodynamics.
Newtonian and quantum mechanics.
Relativity.
Nuclear energy and radioactivity.
Life: the difference between living and non-living molecules, the origins of life.
The universe and its structure: planets, stars, galaxies, quasars, black holes, white holes, etc.
Cosmology and cosmogony.

TEACHING METHODOLOGY

Normal lectures with occasional 2-hour sessions involving practical work in photography (dark room) and astronomy (telescope and planetarium).

EVALUATION

Class tests, assignments, projects and sessional exams, the proportions of which to be determined by both professor and class.

CHEMISTRY 326A
CHEMISTRY 328B
ORGANIC CHEMISTRY

Two Half Courses

PROFESSOR: Prof. M. Baldwin

Description: These two half-courses are taken successively over two terms. They are designed for students who are proceeding to degrees in Biochemistry, Biology and Psychology. The emphasis is on the biological relevance of Organic Chemistry. It is not for students proceeding to a Major or Honours degree in pure Chemistry.
Lectures, 3 hours per week.
Laboratory work, 3 hours per week.

Texts: To be announced.

Prerequisite: One full course in General Chemistry, equivalent to Chemistry 112Z.

Special Comments: 2 x 3 credits.
A pass mark in both laboratory and theory is necessary to pass each half course.

CHEMISTRY 322Z
ORGANIC CHEMISTRY

Full Course

Professor:

Dr. M. Doughty

Description:

A first year organic chemistry course which presumes no previous knowledge. It is based on the view that organic chemistry is essentially the chemistry of the covalent bond and is thoroughly mechanistic in its approach. This course constitutes the first half of a four-term programme in organic chemistry.

Three one-hour lectures a week for two semesters.

Three-hour laboratory once a week.

Texts:

Hendrick, Cram and Hammond, "Organic Chemistry", 3rd Edition, McGraw-Hill.

Helmkamp and Johnson, "Selected Experiments in Organic Chemistry", Freeman and Co.

Prerequisite:

One full course in General Chemistry, equivalent to Chemistry 112Z.

Special Comments:

A difficult course. For Chemistry Majors and Honours only. Chemistry 326/328 are not equivalent.
6 Credits.

CHEMISTRY 326A
CHEMISTRY 328B
ORGANIC CHEMISTRY

Two Half Courses

PROFESSOR:

Prof. M. Baldwin

Description:

These two half-courses are taken successively over two terms. They are designed for students who are proceeding to degrees in Biochemistry, Biology and Psychology.

The emphasis is on the biological relevance of Organic Chemistry. It is not for students proceeding to a Major or Honours degree in pure Chemistry.

Lectures, **3 hours per week.**

Laboratory work, 3 hours per week.

Texts:

To be announced.

Prerequisite:

One full course in General Chemistry, equivalent to Chemistry 112Z.

Special Comments:

2 x 3 credits.

A pass mark in both laboratory and theory is necessary to pass each half course.

CHEMISTRY 336Z
PHYSICAL CHEMISTRY

Professor: Day

Evening

Dr. G.J. Trudel

Day: M,W,F. (two
terms)

Evening: W. (two
terms)

Description:

An examination in some detail of the basic areas of physical chemistry with as much rigor as the students preparation will permit. Such areas as the gas state, first, second and third laws of thermodynamics, thermochemistry, chemical kinetics, liquids, colligative properties of solutions, photochemistry and phase equilibria are considered. Lectures only.

Text:

3rd Ed. Barrow (McGraw-Hill) Physical Chemistry

Assignments and Grading:

The evaluation will be based on assignments, class tests and final examinations.

Pre-Requisite Courses:

Chemistry 112: General Chemistry

Further Special Comments:

This course is worth 6 credits.

CHEMISTRY 338Z
PHYSICAL CHEMISTRY FOR BIOCHEMISTS

Day: M, W, F.
(for two terms)

Professor: Day Dr. G.J. Trudel

Description: The course is not intended to be a rigorous treatment of the subject of physical chemistry but an attempt to arouse the students interest in acquiring an understanding of the basic concepts of physical chemistry as they apply to living systems. Such topics as heat, work, energy, entropy, free energy, properties of liquids, transport processes, prpoerties of electrolyte solutions, chemical kinetics and photo-chemistry are considered.

Text: 3rd Ed. Barrow (McGraw-Hill) Physical Chemistry

Assignments and Grading: The evaluation will be based on assignments class tests and final examinations.

Pre-Requisite Courses: Chemistry 112 - General Chemistry.

Further Special Comments: This course is worth 6 credits.

CHEMISTRY 342A
ANALYTICAL CHEMISTRY

Day: Tues. & Thurs.
1 1/2 hrs. each
day for 1 term

Professor: Dav
Dr. G.J. Trudel
Evening

Evening: Mon. 7-9:30
for 1 term

Description: An introduction to the theory of Gravimetric and Volumetric analysis without being highly specific and yet to a depth which makes it truly understandable. Topics considered include treatment of analytical data, acid-base and oxidation-reduction titrations. Theory of precipitation and complex formation analysis. The lab provides experience in the use of volumetric, gravimetric and simple instrumental methods of analysis.

Texts: Chemical Separations and Measurements
"Theory and Practice of Analytical Chemistry" by Peters/Hayes/Hieftje (Saunders).

Assignments and Grading:

The evaluation will be based on laboratory reports, assignments, class tests and final examinations.

Pre-Requisite Courses:

Chemistry 112 and Chemistry 322 or 326 and Chemistry 336 or 338 unless taken concurrently.

Further Special Comments:

This course is worth 3 credits.

CHEMISTRY 427-B
BIO-ORGANIC CHEMISTRY

Professor: Dr. T. Nogrady

Description: The course is designed to complement and extend the bio-organic Chemistry presented in the first half of Chemistry 490-Z. It deals in detail with heterocyclic compounds of biological interest whether natural products or drugs, alkaloids, terpenes, steroids and lipids.

Three hours per week for one term.

Text: Selected papers, no text available

Grading: One class test (30%) one term paper (70%)

Prerequisites: Chemistry 326/328 or equivalent.

Special Comments:

Recommended for students interested in biochemistry or medicinal chemistry.

CHEMISTRY 433A

Half Course

CHEMICAL THERMODYNAMICS

Professor:

Dr. K. Eklér

Description:

Isothermal and Adiabatic expansion, Heat Engine, Heat Pump, Refrigerator, Entropy, Gibbs Free Energy, Work Content, Fugacities, Equilibrium Constant, Real Gases, Third Law, Activities, Electrolytes and non-Electrolytes.

Text:

Lewis and Randall, Thermodynamics.

Prerequisites:

This is a second course in thermodynamics. Students must have a good grasp of differentiation and integration and must have had a course in physical chemistry with an introduction to thermodynamics.

Evaluation:

Based on 2 class-tests and final exam.

CHEMISTRY 344B
ANALYTICAL CHEMISTRY

Half Course

Professor:

Dr. R.H. Zienius

Description:

An introductory course in instrumental methods of analysis, especially spectroscopic techniques such as emission spectroscopy, atomic and molecular absorption spectrophotometry, infrared, and nuclear magnetic resonance spectroscopy together with an introduction to electrochemical methods to be covered in Chemistry 442A. Lectures and laboratory.

Texts:

For Chemistry students: Willard, Merritt and Dean, "Instrumental Methods of Analysis", 5th edition. (Van Nostrand).

For non-Chemistry students: Peters, Hayes and Hieftje, "Chemical Separations and Measurements", (Saunders)

For all students: "Laboratory Manual" by R.H. Zienius, 2nd edition.

Assignments & Grading:

Problems and interpretation of simple IR and NMR spectra form a part of this course. Approximately one assignment every two weeks will be required.

The final grade will be based on assignments, mid-term test, laboratory work, and the final examination. A passing grade must be obtained in both the theory and laboratory parts of this course.

Prerequisites:

Chemistry 342A and, unless taken concurrently, Chemistry 322 or 326/8 and Chemistry 336 or 338.

Further Special
Comments:

3 credits.

CHEMISTRY 422Z
ORGANIC CHEMISTRY

Full course

Professor:

Dr. M. Doughty

Description:

A continuation of Chemistry 322Z
for Chemistry students only.
Mechanistic in approach.
Three one-hour lectures a week.
One semester laboratory.

Texts:

As for Chemistry 322Z

Prerequisite:

Chemistry 322Z

Special Comments:

For Chemistry Majors and Honours
only.
6 Credits.

CHEMISTRY 442A
ADVANCED ANALYTICAL CHEMISTRY

Professor: Dr. R.H. Zienius

Description: A continuation of the study of instrumental analysis following Chemistry 344B with special emphasis being given to electrochemical methods of analysis, and to separation techniques.

Texts: For Chemistry students: Willard, Merritt and Dean, "Instrumental Methods of Analysis", 5th edition (Van Nostrand).

For non-Chemistry students: Peters, Hayes and Hirsche, "Chemical Separations and Measurements" (Saunders).

For all students: "Laboratory Manual" by R.H. Zienius.

Assignment & Grading: Problem assignments form a part of this course. Completion of approximately one assignment every two weeks will be required. The final grade will be based on assignments, a mid-term test, laboratory work, and the final examination. A passing grade must be obtained in both the theory and laboratory parts of this course.

Prerequisites: Chemistry 344B.

Further Special 3 credits

Comments:

CHEMISTRY 444B
ADVANCED ANALYTICAL CHEMISTRY

Professors: Dr. R.H. Zienius & Prof. M. Baldwin

Description:

A discussion of more specialized techniques of analytical chemistry, such as Raman Spectroscopy, Electron Spin Resonance, X-Ray Spectroscopy, Mass Spectroscopy, Radiochemical Methods, etc., makes up the bulk of the lecture part of the course. The laboratory is devoted to the analysis of organic compounds (single and mixtures) using both classical and modern spectroscopic techniques. Lectures and laboratory.

Texts:

Willard, Merritt and Dean, "Instrumental Methods of Analysis", 5th edition. (Van Nostrand).

Assignments & Grading:

Assignments on interpretation of spectra form a part of this course. Completion of about one assignment every two weeks will be required. The final grade will be based on assignments, a class test based exclusively on spectra interpretation, laboratory work, and the final examination. A passing grade must be obtained in both the theory and laboratory parts of this course.

Prerequisite:

Chemistry 442A

Further Special
Comments:

3 credits.

CHEMISTRY 452Z
INDUSTRIAL CHEMISTRY

Professors:

Day: Dr. R.H. Zienius

Summer:

Description:

This course is intended to familiarize the student with the workings of the chemical industry, and to show him how his knowledge of chemistry can be used in industry. Accordingly, a brief outline is presented of the history of the chemical industry, the development of chemical processes, unit operations and equipment followed by a discussion of those organic and inorganic industries of most importance to Canada.
Lectures only.

Texts:

None are required. A number of reference books, however, are recommended.

Assignments & Grading:

There are no assignments that need to be handed in, in this course. The final grade is based on three examinations held at intervals during the year. Each covers one-third of the course.

Prerequisites:

Chemistry 112 and an introductory organic chemistry course.

Further Special
Comments:

1. A total of 8 half-day plant tours are an integral part of this course. They take place at regular intervals in the first and second terms.
2. 6 credits.

CHEMISTRY 490-Z
INTRODUCTORY BIOCHEMISTRY

Professor: day Dr. T. Nogrady
 evening

Description: First term: Bio-organic chemistry of carbohydrates, aminoacids, proteins, nucleotides and nucleic acids and lipids.

Second term: Overall view of cellular metabolism. Catabolic reactions: carbohydrate, lipid and protein degradation. The respiratory chain and oxidative phosphorylation, bioenergetics.

Three lectures per week, plus laboratory (both terms)

Text: Bronk: Chemical biology (subject to change)

Rendina: Experimental methods in modern biochemistry.

Grading: Two class tests and two exams: 80%
 Laboratory 20%

Prerequisite: Chemistry 326/328, Chemistry 338Z
 (not compulsory for biology students.)

Further comments: 6 credits

CHEMISTRY 525B
CHEMISTRY OF HIGH POLYMERS

Day: Tues. & Thurs.
1 1/2 hrs. each
day for 1 term

Professor: Dr. G.J. Trudel (Day)

Description: The science of macromolecules is divided between biological and non-biological materials. This course is concerned with the chemistry, physics and technology of non-biological polymers. These are primarily the synthetic materials used for plastics, fibers and elastomers, but a few naturally occurring polymers such as rubber, wool and cellulose are included.

Texts: Fred. W. Billmeyer Jr. (Interscience).
Textbook of Polymer Science.

Assignments

& Grading: The evaluation will be based on assignments, class test and final examination.

Pre-Requisite

Courses: Chemistry 112, 322 and 523A

Further

Special Comments: The course is worth 3 credits.

CHEMISTRY 490-Z
INTRODUCTORY BIOCHEMISTRY

Professor: day Dr. T. Nogrady
evening

Description: First term: Bio-organic chemistry of carbohydrates, aminoacids, proteins, nucleotides and nucleic acids and lipids.

Second term: Overall view of cellular metabolism. Catabolic reactions: carbohydrate, lipid and protein degradation. The respiratory chain and oxidative phosphorylation, bioenergetics.

Three lectures per week, plus laboratory
(both terms)

Text: Bronk: Chemical biology (subject to change)

Rendina: Experimental methods in modern biochemistry.

Grading: Two class tests and two exams: 80%
Laboratory 20%

Prerequisite: Chemistry 326/328, Chemistry 338Z
(not compulsory for biology students.)

Further comments: 6 credits

CHEMISTRY 535A
RADIATION CHEMISTRY

Day: M, W, F for
1 term

Professor: Dr. G.J. Trudel (day)

Description:

A brief and simple introduction to radiation chemistry. It is intended for students with a knowledge of chemistry who wish to make their first acquaintance with radiation chemistry. In particular it should be suitable for undergraduate and graduate students.

This is an age when the boundaries between the main branches of chemistry are becoming more diffuse and studies are becoming interdisciplinary within chemistry and within science. A course in radiation chemistry clearly illustrates this trend. Radiation chemistry is far from being a narrow specialization. It draws upon and contributes to, most other fields of chemistry and branches of science.

The study of the effects of radiation on chemical systems provides information about the mechanisms and rates of chemical reactions particularly those involving free radicals and ions, which are not readily investigated by conventional methods.

Texts:

A.J. Swallow (Longman) Radiation Chemistry, "An Introduction".

Assignments &

Grading:

The evaluation will be based on assignments, class test and a final examination.

Pre-Requisite
courses:

Chemistry 112.

Further Special
Comments:

This course is worth 3 credits.

CHEMISTRY 541A
NATURE AND ANALYSIS OF POLLUTANTS

Professor: Day: Dr. R.H. Zienius
Summer:

Description: This course is intended to prepare a student already familiar with the basics of analytical chemistry, including instrumental analysis to carry out air and water pollution studies. Following a survey of major industrial and municipal pollutants, a description is given of measuring systems, sampling procedures, and concentration and separation techniques. Topics such as continuous monitoring systems, automated analyses, and the like are also discussed.
Lectures only.

Text: J.O. Ledbetter, "Air Pollution - Part A, Analysis". (Marcel Dekker).

A number of reference books are also recommended.

Assignments & Grading: There are no assignments that need to be handed in, in this course. The final grade is based on a mid-term test, and on the final examination.

Prerequisites: Chemistry 112, and an introductory course in analytical, and one in organic chemistry.

Further Special
Comments:

1. Two or three half-day tours of pollution analysis (or air and water analysis) laboratories constitutes an integral part of this course.
2. Science students, who lack the prerequisite in analytical chemistry, may under special circumstances, with the permission of the professor, be allowed to take this course.
3. 3 credits.

CHEMISTRY 590-Z
ADVANCED BIOCHEMISTRY (6 credits)

Professor: Dr. T. Nogrady

Description: A continuation of Chemistry 490-Z. Photo-synthesis. Biosynthesis of small molecules, macromolecules. Biological transport mechanisms, membrane structure. Control of protein synthesis, molecular genetics. Regulation of enzyme activity. Muscle contraction, neuro-chemistry.

Three lectures per week, laboratory for one term.

Text: Bronk: Chemical biology (subject to change).

Grading: Two class tests and two exams 80%
Laboratory 20%

Prerequisite: Chemistry 490-Z

CHEMISTRY 592-Z

MEDICINAL CHEMISTRY (6 credits)

Professor: Dr. T. Nogrady

Description: Types of drug action. Influence of physiochemical properties; quantitative methods. Pharmacological effects of specific groups, structure-activity relations. Drug receptors, drug-receptor interactions. Mechanisms of drug action. Principal types of drugs, drug design. Three lectures per week.

Texts: Korolkovas: Essentials of molecular pharmacology.

Grading: Two class tests, a final exam and a term paper.

Prerequisites: Chemistry 490-Z, Chemistry 338Z.

Recommended: Chemistry 427B.